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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the classifier used for the granulation method and this granulation method of the sintering raw material at the time of manufacture of the sintered ore inserted in a shaft furnace.

[0002]

[Description of the Prior Art]A sintered material has many brands, and the pulverization of a raw material is in the inside which he follows further, and the stability and improvement in performance when corning a sintering raw material become indispensable for improvement in the stable operation of sintering, and productivity. Although the drum mixer in which mass processing is possible is used as equipment which mixes and corns the sintering raw material supplied to a sintering machine, Since the lamination factor (area ratio for which the sintering raw material in the cross-section area of a drum mixer accounts) in a drum mixer is changed by change of the quantity of production, rolling granulation performance changes and this drum mixer causes operation change.

[0003]As a thing for solving the above-mentioned problem, to JP,59-213432,A and JP,59-199029,A. The quantity through which it circulates from the appearance side transportation lines of a drum mixer to the ON side of this drum mixer or the drum mixer of the upstream is adjusted, and the method of controlling to become the optimal lamination factor to the rolling granulation in a drum mixer is indicated.

[0004]As what circulates the granulation thing from a drum mixer as mentioned above, and raises the granulation effect, to JP,59-20735,B. Arrange an inclination plate to the drum mixer appearance side, and it classifies by making it flow down a granulation thing on inclination monotonous, As it said that it circulated through the fine grain part located in the upper layer among the sedimentary layers of the coarse grain and the fine grain which are formed of the

particle size distribution produced on the conveyer arranged under the inclination plate to scraping and an upstream drum mixer, the method of supplying only coarse grain to a sintering machine positively is indicated.

[0005]As mentioned above, it is for the large thing of particle diameter rolling to the skirt of a long distance deposition mountain at the time of the fall from a ramp, and what has small particle diameter stopping directly under a ramp among the granulation things in which it flows down on inclination monotonous that size segregation arises in a granulation thing on a conveyer. Above-mentioned JP,59-20735,B classifies the coarse grain and the fine grain of a granulation thing using this principle.

[0006]

[Problem(s) to be Solved by the Invention]However, it is only distributing quantitatively the granulation thing to supply to a sintering machine, and the granulation thing to circulate to a drum mixer, and the thing of above-mentioned JP,59-213432,A and JP,59-199029,A does not show how to distribute coarse grain and a fine grain clearly. Since a granulation thing is quantitatively distributed and circulated as mentioned above in these methods, it means saying that the coarse grain which should be distributed to a sintering machine is returned repeatedly at a drum mixer into the raw material supplied to a drum mixer, and is inefficient.

[0007]Although the fine grain deposited on the upper levels in the sedimentary layers of the granulation thing on a conveyer is scratched in above-mentioned JP,59-20735,B with the scraper arranged in the upper levels of a conveyance downstream side, If it sets the scraping depth constant, and even the coarse grain deposited on a lower layer will scratch it if this method is thick, and its thickness of sedimentary layers is thin on the contrary, the fault of not scratching the fine grain deposited on the upper layer, either will produce it. Therefore, in order to raise classification efficiency certainly by such a method, it is necessary to control the discharge of a granulation thing or to control the scraping depth according to the thickness of the sedimentary layers of a granulation thing so that the relation between the thickness of the sedimentary layers on a conveyer and the scraping depth is always kept constant, and, About this point, it is not clearly shown at all by above-mentioned JP,59-20735,B. In a described method, although the surface of sedimentary layers is evenly leveled with an inclination plate, when external force is added to the granulation thing discharged from the drum mixer in this way, there is a possibility that pseudo grain may collapse.

[0008]About a device side, it will be necessary to prevent a granulation thing from adhering to an inclination plate or a scraper, and providing the member for it, etc. will have a possibility of causing an increase in cost. There is a problem that the performance of classification is unmaintainable in the management about the thickness of the sedimentary layers of the granulation thing on a conveyer or the scraping depth of a scraper being insufficient as mentioned above. When it is made to circulate to an upstream drum mixer, a granulation

principle is a rolling granulation, and since the comparatively detailed raw material used as a core adheres to the raw material of coarse grain and pseudo grain is constituted, the combination of a raw material needs to blend the raw material used as the nuclear particle corresponding to it, and a detailed raw material by a proper ratio.

[0009]Blend the sintering raw material to corn, put in to a drum mixer, if it is desirable to supply only a proper granulation thing to a sintering machine, are, but. In what classifies the raw material after coming out of a drum mixer like JP,59-20735,B, and circulates only a fine grain to an upstream drum mixer. Although some granulation performances carry out an uptrend under the influence to which the lamination factor in a drum mixer goes up, since it is the transient granulation process that mixing and a rolling granulation are carried out in the state where a nuclear particle is insufficient, within a drum mixer, it cannot be satisfied to that extent then.

[0010]This invention is for solving the above-mentioned problem.

The purpose is to provide the classifier used for the granulation method of a sintering raw material and it which can classify coarse grain and a fine grain properly among the granulation things discharged from the drum mixer, can be further conveyed to a sintering machine about coarse grain, and can be certainly corned efficiently about a fine grain.

[0011]

[Means for Solving the Problem]In order to attain the above-mentioned purpose, this invention makes a granulation thing discharged from an upstream granulator deposit, It classifies in a fine grain and coarse grain using particle size distribution produced in this deposition mountain, and coarse grain is conveyed to a sintering machine, after a fine grain performs kneading processing or mixed agitation treatment, it is corned, and it is carrying out to circulating a discharging end part of an upstream granulator again. By doing in this way, a granulation thing can be classified efficiently, and a fine grain of them can be used as firm coarse grain.

[0012]

[Embodiment of the Invention]The granulation method of the sintering raw material of this invention is the method of corning a sintering raw material, After mixing and corning a sintering raw material with an upstream granulator, classify the granulation thing discharged from the outlet of this granulator in a fine grain and coarse grain, convey coarse grain to a sintering machine, and a fine grain, Corn, after performing kneading processing or mixed agitation treatment, and it is made to circulate the discharging end part of an upstream granulator again, and weighing is carried out on the course which conveys coarse grain to a sintering machine if needed, and the circulating load of a fine grain is controlled so that the sintering quantity of production can provide meals with coarse grain.

[0013]According to this invention method, a granulation thing becomes possible [corning firm coarse grain] by classifying, and giving high energy mechanically to the taken-out fine grain by performing kneading processing or mixed agitation treatment, then carrying out rolling granulation. Since the granulation thing through which it circulated had a possibility that the granulation thing to discharge from an upstream granulator and the granulation thing through which it circulated might collide, and particles might collapse when it was returned to the classifier, it was returned to the discharging end part of the upstream granulator. Thereby, the granulation thing through which it circulated, and the granulation thing corned with the upstream granulator are sent to a classifier, without disturbing a discharge locus mutually, and is classified properly. If weighing is carried out on the course which conveys coarse grain to a sintering machine and the circulating load of a fine grain is adjusted, the coarse-grain amount of supply to a sintering machine can be adjusted certainly.

[0014]The classifier of this invention is composition as shown below, and explains the classification principle first. As shown in drawing 8 (a) and (b), the discharge locus of the granulation thing discharged from the drum mixer D which is an upstream granulator is provided with the following.

The velocity component V_y which carries out free fall in the direction of the ground.

The velocity component V_z discharged to the shaft direction of the drum mixer D.

The velocity component V_r of the radial direction which carries out rolling fall of the inclined plane formed in the inside of the drum mixer D.

And a fine grain deposits the deposition mountain by the discharged granulation thing on the inside, and the particle size distribution in which coarse grain rolls an outside surface produces it.

[0015]The granulation thing discharged from the drum mixer D forms the deposition mountain M, and drawing 9 shows particle size distribution when a fine grain and coarse grain are classified regularly. The granulation thing which coarse grain rolled the granulation thing as a steady flow in the outside surface of the deposition mountain M, and was deposited on the inside of the deposition mountain M in early stages remains. Then, first, since coarse grain rolled the outside surface of the deposition mountain M, guide plate G made to incline with a bigger angle than the angle of repose at the time of the upper bed being located near the outlet of the drum mixer D so that coarse grain may roll only to the one side of the deposition mountain M, and making a granulation thing deposit was provided. the steady flow of a granulation thing being divided by this the coarse-grain side surface of the deposition mountain M, and near the shortest passage from guide plate [by the side of a fine grain] G to the outlet of a fine grain, and, If the coarse grain of an outside surface which rolls to the opposite side on the other hand is taken out along with the shape of the deposition mountain M, only coarse grain can be taken out efficiently, and if the granulation thing deposited on the coarse-grain

side of the deposition mountain M, an opposite hand, and an inside is taken out on the other hand, only the fine grain can be taken out efficiently.

[0016]The classifier of this invention uses a principle which was described above, and the 1st classifier of this invention is characterized by comprising the following:

The guide plate made to incline with a bigger angle than the angle of repose at the time of the upper bed being located near the outlet of an upstream granulator, and making a granulation thing deposit.

The fine grain lateroversion cam plate which countered with the guide plate across the discharge position of a granulation thing so that it might be made to move caudad one by one, and provided the fine grain of the discharged granulation things.

The coarse-grain lateroversion cam plate which inclined toward the opposite hand from the upper bed of the fine grain lateroversion cam plate so that the coarse grain of the discharged granulation things might be rolled caudad one by one.

The extra jacket mechanism which scratches the fine grain led by the guide plate and a fine grain lateroversion cam plate.

[0017]In the 1st classifier of the above, the fine grain inside a deposition mountain is caudad led one by one by the guide plate and a fine grain lateroversion cam plate. And the fine grain guided at the fine grain lateroversion cam plate and the guide plate is scratched by an extra jacket mechanism. On the other hand, since the inclined plane is located under the surface of the outside surface of a deposition mountain which coarse grain rolls as for the coarse-grain lateroversion cam plate, coarse grain rolls a coarse-grain lateroversion cam-plate top promptly from a deposition mountain. At this time, since coarse grain rolls a deposition mountain slant face, the granulation effect is promoted. However, as shown in drawing 9, even if it does not form the internal coarse grain and fine grain lateroversion cam plate of the deposition mountain M, a classification is possible for them.

[0018]The band conveyor which replaces the 2nd classifier with the fine grain side of the 1st classifier of the above and a coarse-grain lateroversion cam plate, and an extra jacket mechanism, and carries out horizontal arrangement under the guide plate, It has a positioning apparatus which adjusts the tip position of this band conveyor so that it may be located inside a little rather than the portion and the hem part of the deposition mountain of an opposite hand to which it is shown to the tip of this band conveyor by a guide plate. In the 3rd classifier, the tip position of the band conveyor in the 2nd classifier of the above is set up with an angle adjustment.

[0019]In these 2nd and 3rd classifiers, the fine grain which the coarse grain rolling on the layer part of a deposition mountain is taken out from the tip of the band conveyor which had the position at a tip adjusted, and is located in the inside of a deposition mountain is taken out from

the end face by the drive of a band conveyor.

[0020]The rotor plate of the ring shape on which the granulation thing in which the 4th classifier was discharged from the upstream granulator is made to deposit, Have a conical shape member placed in a fixed position in order to cover the central opening of this rotor plate, when it sees from a flat surface on the center of rotation of this rotor plate, and this conical shape member, The gap part which makes that hem part perimeter estrange from a rotor plate, and is open for free passage to the central opening of this rotor plate is formed, and the extra jacket member which leads a fine grain to this gap part is provided.

[0021]In the 4th classifier of the above-mentioned composition, a granulation thing is discharged by the rotor plate of ring shape, and where a conical shape member is included, it forms a deposition mountain. Since the conical shape member is placed in a fixed position, the fine grain located in the inside of a deposition mountain is taken out from the gap part of a conical shape member. On the other hand, the coarse grain located in the outside surface of a deposition mountain is taken out from the peripheral edge of a rotor plate.

[0022]On the other hand, the 5th classifier the outlet which has arranged the side attachment wall near the outlet of an upstream granulator, and established it caudad on the other hand in order to receive the granulation thing discharged from the upstream granulator A near side attachment wall. It has the hopper formed near the one side [this] wall and the side attachment wall which counters, and the **** means formed in both outlets.

[0023]In the 5th classifier of the above-mentioned composition, a fine grain is taken out from the outlet of a hopper provided near the side attachment wall on the other hand, and coarse grain is taken out from the outlet provided near the one side [this] wall and the side attachment wall which counters.

[0024]On the other hand, the 6th classifier the outlet which has arranged the side attachment wall near the outlet of an upstream granulator, and established it caudad on the other hand in order to receive the granulation thing discharged from the upstream granulator A near side attachment wall. It forms near a one side [this] wall and the side attachment wall which counters, and has the hopper which made low the height of a one side [this] wall and the side attachment wall which counters, the shot to which it shows the coarse grain which overcame and overflowed the side attachment wall in which this hopper counters, and a **** means which cuts down the fine grain in a hopper.

[0025]In the 6th classifier of the above-mentioned composition, a fine grain is taken out from the outlet of a hopper, and after the coarse grain rolling on the outside surface of a deposition mountain overcomes the side attachment wall which made the height of the hopper low, it is taken out via a shot.

[0026]

[Example]Below, the example about this invention is described with reference to drawing 1 -

drawing 7. Drawing 1 is a figure for explaining the granulation method of this invention.

Drawing 2 is a figure showing the outline composition of the 1st classifier of this invention.

Drawing 3 is a figure showing the outline composition of the 2nd classifier of this invention.

Drawing 4 is a figure showing the outline composition of the 3rd classifier of this invention.

Drawing 5 is a figure showing the outline composition of the 4th classifier of this invention.

Drawing 6 is a figure showing the outline composition of the 5th classifier of this invention.

Drawing 7 is a figure showing the outline composition of the 6th classifier of this invention.

[0027]The granulation method of the sintering raw material of this invention is applied to the granulation installation 1 as shown in drawing 1. First, after the rolling granulation of the sintering raw material cut down from the raw material tub 2 is carried out with the 1st and 2nd drum mixer 3 and 4, it is classified in coarse grain and a fine grain with the classifier 5. And among the granulation things classified with the classifier 5, coarse grain is conveyed on the band conveyor 6 to the sintering machine 7, and is made with sintered ore. On the other hand, after a fine grain passes a kneading treating part or the mixed agitation treatment part 8, it carries out rolling granulation with the 3rd drum mixer 9, and it circulates through it to the discharging end part of the 2nd drum mixer 4 again. The granulation installation 1 has arranged the weighing instrument 10 for controlling the circulating load of a fine grain so that the sintering quantity of production can provide meals with coarse grain on the conveying path to the sintering machine 7. With this weighing instrument 10, the sintering quantity of production can be investigated with coarse-grain transportation quantity, the circulating load of a fine grain can be adjusted according to coarse-grain transportation quantity, there is no production loss, and the amount of supply of the granulation thing to the sintering machine 7 can control certainly.

[0028]In the above-mentioned procedure, the fine grain classified with the classifier 5, After passing through the kneading treating part 8 which applies external force by a damp or wet condition, and kneads a fine grain together, or the mixed agitation treatment part 8 which carries out mixed stirring of the fine grain with the agitating blades which carry out a high velocity revolution so that a granulation may be carried out to the predetermined diameter of a granulation, By corning again with the 3rd drum mixer 9, the granulation of the most is carried out to the coarse grain of moderate particle diameter, and it is returned to the discharging end part of the 2nd drum mixer 4. The granulation thing discharged from the 3rd drum mixer 9 in this invention is returned to the discharging end part of the 2nd drum mixer 4 in order to lead to the classifier 5, without disturbing the discharge locus of the granulation thing discharged from the 2nd drum mixer 4. Productivity improves by processing in this way.

[0029]Although the classifier 5 in particular of this invention used for the above-mentioned granulation method is not limited, by adopting the thing of various composition like the 1st - the 6th classifier which are explained below, it is stabilized and can supply only coarse grain to the

sintering machine 7. Drawing 2 is what showed the 1st classifier 11 of this invention, and is the following composition. 12 is the guide plate set up to inclined form, the upper bed is located near the granulation thing immediately after discharging from the 2nd drum mixer 4, and coarse grain is kept from flowing into the fine grain side. Therefore, the angle of gradient of this guide plate is an angle which serves as a bigger inclination than the angle of repose θ at the time of making the granulation thing discharged from the 2nd drum mixer 4 deposit.

[0030]Lead the fine grain of the granulation things which 13a has been arranged on the bottom plate 14 formed in the outlet lower part of the 2nd drum mixer 4, and were discharged from the 2nd drum mixer 4 with said guide plate 12, and. As for the fine grain lateroversion cam plate which acts so that this fine grain may move caudad one by one, and 13b, the fine grain lateroversion cam plate 13a and an upper bed contact, and a lower end is a coarse-grain lateroversion cam plate arranged that it should incline in a counter direction, and performs the same operation as the fine grain lateroversion cam plate 13a to coarse grain. That the fine grain led by the guide plate 12 and the fine grain lateroversion cam plate 13a should be scratched from a deposition mountain, 15 is the extra jacket nail in which deposition Yamauchi was made to insert the part, for example, is rotated with the drives 16, such as a motor. The shot to which it shows the fine grain which scratched 17 with the extra jacket nail 15 to the band conveyor 18, and 19 are shots which show the coarse grain rolling on the deposition Yamasoto surface to the band conveyor 20. Hereafter, in the 2nd - the 6th classifier, a common reference number is attached about a common member, it is shown in a figure, and explanation of composition is omitted.

[0031]If it is in the classifier 11 of the above-mentioned composition, the granulation thing discharged from the 2nd drum mixer 4 is deposited on the fine grain lateroversion cam plate 13a installed in the bottom plate 14, and the coarse-grain lateroversion cam plate 13b. And by operation of said fine grain lateroversion cam plate 13a and the coarse-grain lateroversion cam plate 13b, this deposition mountain is classified in a fine grain and coarse grain, and coarse grain rolls the coarse-grain lateroversion cam-plate 13b top, and is conveyed via the shot 19 and the band conveyor 20 to the sintering machine 7. On the other hand, the fine grain led to the fine grain lateroversion cam plate 13a is scratched by the extra jacket nail 15 rotated with the drive 16, is led to the band conveyor 18 via the shot 17, and is conveyed by the above-mentioned circulatory system. He is trying for the arrangement on the bottom plate 14 of the fine grain lateroversion cam plate 13a and the coarse-grain lateroversion cam plate 13b to change a position suitably corresponding to the angle of repose of the deposition mountain determined according to the description of a granulation thing, etc.

[0032]Drawing 3 is what showed the 2nd classifier 21 of this invention, and is the following composition. It differs in that replaced this classifier 21 with the bottom plate 14 of the 1st classifier 11 shown in above-mentioned drawing 2, the fine grain lateroversion cam plate 13a

and the coarse-grain lateroversion cam plate 13b, and the extra jacket nail 15, and it has the band conveyor 22. This band conveyor 22 has been arranged at a level with the lower part of a deposition mountain, and it is arranged so that it may be further located inside a little rather than the hem part of the portion and the deposition mountain of an opposite hand to which it is shown to that tip by the guide plate 12. The band conveyor 22 sets up the tip position corresponding to the angle of repose θ of the deposition mountain which changes with positioning apparatus 23 according to the description of a granulation thing.

[0033]A conveyance drive is carried out in the direction which the guide plate 12 set up, the band conveyor 22 takes out the fine grain inside a deposition Yamashita direction, and the taken-out fine grain is conveyed via the shot 17 to the band conveyor 18. On the other hand, coarse grain rolls the inclination of a deposition mountain, falls from the tip of the band conveyor 22, and is conveyed via the shot 19 to the band conveyor 20. In this 2nd classifier 21, since the band conveyor 22 sets up a tip position corresponding to the angle of repose which changes according to the description of a granulation thing, it can perform a proper classification according to a granulation thing. The band conveyor 22 is not restricted to what carries out horizontal arrangement, but is made to incline, and may be arranged.

[0034]Drawing 4 is what showed the 3rd classifier 31 of this invention, the classifier 31 of the 3rd example is replaced with the positioning apparatus 23 of the 2nd classifier 21 of the above, and the angle adjustment 33 is installed so that standing-up rocking of the tip of the band conveyor 32 may be made to carry out in the guide plate 12 direction.

[0035]Drawing 5 shows the 4th classifier 41 of this invention. 42 is a rotor plate of the ring shape arranged in the outlet lower part of a granulation thing, and rotates by the motor 42a. It is a conical shape member (henceforth a cone member) placed in a fixed position above this rotor plate 42 in order to cover the central opening of the rotor plate 42, when it sees [43] from a flat surface, as shown in drawing 5 (b). This cone member 43 makes that hem part perimeter estrange from the rotor plate 42, and forms the central opening of the rotor plate 42, and the gap part 47 open for free passage. 44 is the scraper formed in said gap part 47 so that it might be made to project more greatly than the bottom diameter of this cone member 43 and a fine grain might be led to this gap part 47. 45 is protection-against-dust covering keep the granulation thing which covered and deposited the rotor plate 42 from overflowing from the rotor plate 42, and the scraper 46 with which coarse grain is led to the opening 45a by rotation of the rotor plate 42 is formed in the opening 45a provided in this protection-against-dust covering 45.

[0036]The deposition mountain on the rotor plate 42 is deposited on a cone form with the vertex which made the same the center of rotation of the rotor plate 42, and coarse grain rolls the outside surface of a deposition mountain promptly, and is raked out by the scraper 46 to the opening 45a. On the other hand, a fine grain is raked out by the scraper 44 to the gap part

47. Since a granulation thing will contact the lower part of the wall surface of the protection-against-dust covering 45, and the scraper 46 will overflow out of the rotor plate 42 and will be discharged if a deposition mountain becomes larger than the rotor plate 42, also suppose that it is unnecessary. In this case, what is necessary is just to take the measures against antisticking against the range in contact with the granulation thing of the protection-against-dust covering 45.

[0037]Drawing 6 shows the 5th classifier 51 of this invention, and 52 is a hopper which receives a granulation thing from the 2nd drum mixer 4, and, on the other hand, arranges the side attachment wall 52a near the outlet of the 2nd drum mixer 4. And the outlets 52b and 52c of this hopper 52 are plane view, and are formed near the one side [this] wall 52a and the side attachment wall 52d which counters (52c) near said one side wall 52a (52b). 53 is a roll feeder which cuts down the fine grain led to the outlet 52b of the hopper 52 arranged near the side attachment wall 52a on the other hand. 54 is a roll feeder which cuts down the coarse grain led to the outlet 52c arranged near the side attachment wall 52d in which the hopper 52 counters.

[0038]If it is in the classifier 51 of the above-mentioned composition, the coarse grain of the granulation things of the hopper 52 discharged since the side attachment wall 52a has been arranged in the outlet lower part of the 2nd drum mixer 4 on the other hand, It rolls toward the side attachment wall 52d which counters, and it shows around by rotation of the roll feeder 54 at the side attachment wall 52d, and is moved and started from a lower part. On the other hand, on the other hand, a fine grain is deposited near the side-attachment-wall 52a, and is cut down with the roll feeder 53.

[0039]Drawing 7 shows the 6th classifier 61 of this invention, and is the following composition. 62 is a hopper which receives a granulation thing from the 2nd drum mixer 4, and, on the other hand, arranges the side attachment wall 62a near the outlet of the 2nd drum mixer 4. And on the other hand, this hopper 62 makes low the height of the side attachment wall 62a and the side attachment wall 62b which counters, and he is trying for coarse grain to overcome this side attachment wall 62b among the granulation things which it was discharged from the 2nd drum mixer 4, and were deposited. The coarse grain which overcame this side attachment wall 62b is led to the band conveyor 20 via the shot 19. On the other hand, the fine grain deposited in the hopper 62 is cut down with the roll feeder 63 provided in the outlet 62c, and is led to the band conveyor 18.

[0040]the raw material inclined plane formed in the 6th above-mentioned classifier 61 of the angle of repose θ of the deposition mountain at the time of the side attachment wall 62b of the hopper 62 making a granulation thing deposit -- abbreviated, since it is set as the same height, The coarse grain of the granulation things discharged from the 2nd drum mixer 4 rolls the inclination of a deposition mountain, overcomes the side attachment wall 62b, and moves

to the band conveyor 20. About a fine grain, it moves caudad in the inside of the hopper 62, and is started with the roll feeder 63.

[0041]The roll feeders [in / not only the above example but various modification is possible for this invention, for example, / the 5th and 6th example of the above] 53, 54, and 63 may be a belt feeder and a you lath feeder.

[0042]

[Effect of the Invention]As mentioned above, according to the granulation method concerning this invention, the granulation thing discharged from the upstream granulator is classified, Since rolling granulation is carried out with a downstream granulator and he is trying to return again the fine grain obtained by that classification to the discharging end part of an upstream granulator after performing kneading processing or mixed agitation treatment, the overall granulation efficiency which can make carry out the granulation of the fine grain efficiently, therefore is performed by this granulation stage improves. The deposition mountain of a granulation thing is formed with classification, therefore a classifier, since he is trying to make the outside surface of a deposition mountain fall, it is stabilized without coarse-grain particles collapsing, and coarse grain can be supplied to a sintering machine. Since a classifier takes out the fine grain located in an inside in the deposition mountain which particle size distribution produced, it can classify coarse grain and a fine grain properly.

[Translation done.]